



10-23 KA-1826-01
 Br. No. 10-23-2.63(191)
 Bob Billings Parkway over K-10
 K-10 (South Lawrence Trafficway)/Bob Billings Parkway

 Douglas Co

 CD2

 N:38.959649 E:-95.334030 (Approx.)

 NW ¼, SW ¼, SW ¼, S32, T12S, R19E

KANSAS DEPARTMENT OF TRANSPORTATION



| | | | | | |
|-----------|-------------------------------------|--------------|-------------------|------------------------|------------------|
| RTE./CO. | K-10 / Douglas | SOUNDING NO. | CD 02 | | |
| | | PROJ. NO. | 10-23 KA-1826-01 | | |
| SITE NAME | K-10 Bob Billings Parkway over K-10 | | HOLE STA. | 50+40 Bob Billings, CL | |
| GEOLOGIST | R. Crow, P.G. | SCALE | 1 inch = 5.0 feet | DATE | October 18, 2011 |
| DRILLER | R. Vervynck | RIG TYPE | CME 55 | TOP HOLE ELEV. | 958.71 |
| GW ELEV. | 934.2 | TOTAL DEPTH | 48.1 | M/B ELEV. | 958.41 |

BOREHOLE REPORT - KANSAS_DOT.GDT - 2/28/13 14:23 - Q:\GEOLOGY\SURFACE\10-23 KA-1826-01\BOB BILLINGS INTERCHANGE.GPJ

| Bit Type | GEOLOGIC NAME | STRATIGRAPHIC COLUMN | DEPTH | ELEVATION | CLASSIFICATION OF MATERIALS DESCRIPTION AND REMARKS | UNCONFINED COMPRESSION (TSF) | ELASTIC MODULUS (PSF) | N60 COUNT (SPT) | ELEVATION |
|------------------|--------------------------|----------------------|-------|-----------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------|-----------|
| 8" Hollow Augers | Soil | | 0.3 | 958.7 | Silty clay, brown, dry Limestone, weathered, broken, hard, gray with rust stain, cherty | | | | |
| | | | | 958.4 | | | | | |
| NQ2 Diamond | Plattsmouth Limestone | | 1 | 955 | Limestone, hard, gray, wavy-bedded, rust-stained, gradual transition to shale below | 340 | 1.75E+08 | | 953.51 |
| | | | 2 | 950 | | 950.6 | 390 | 1.78E+08 | 947.61 |
| | Heebner Shale | | 3 | 945 | 945.4 | Shale, very limy, iron stain, fossil fragments, gray, gradual transition to black shale below Shale, black, fissile, phosphatic nodules, plant fossils, pyritic | 175 | 2.96E+07 | 941.11 |
| | | | | 940 | 944.4 | | | | |
| | LV LS | | 4 | 19.9 | 938.8 | Leavenworth limestone, hard, gray, fine | 273 | 1.91E+08 | 937.71 |
| | Snyderville Shale Member | | 5 | 21.8 | 937.0 | Shale, gray, limy, abundant fossil debris | 11.4 | 1880000 | 933.21 |
| 6 | | | 22.7 | 936.0 | Shale, gray, clayey, weak, shear planes | 13.8 | 2880000 | 929.61 | |



KANSAS DEPARTMENT OF TRANSPORTATION

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|--------------|----------------|-------------------------------------|------------------------|
| RTE./CO. | K-10 / Douglas | SOUNDING NO. | CD 02 |
| | | PROJ. NO. | 10-23 KA-1826-01 |
| SHEET 2 of 3 | | BRIDGE NO. | 10-23-2.63(191) |
| SITE NAME | | K-10 Bob Billings Parkway over K-10 | |
| | | HOLE STA. | 50+40 Bob Billings, CL |

BOREHOLE REPORT - KANSAS DOT.GDT - 2/28/13 14:23 - Q:\GEOLOGY\SURFACE\10-23 KA-1826-01\BOB BILLINGS INTERCHANGE.GPJ

| Bit Type | GEOLOGIC NAME | STRATIGRAPHIC COLUMN | DEPTH | ELEVATION | CLASSIFICATION OF MATERIALS DESCRIPTION AND REMARKS | UNCONFINED COMPRESSION (TSF) | ELASTIC MODULUS (PSF) | N60 COUNT (SPT) | ELEVATION | |
|----------|-----------------------------------------|----------------------|--------------|-----------|---------------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------|-----------------|-----------|--------|
| | NQ2 Diamond Toronto Limestone Member | 6 | | | Shale, gray, clayey, weak, shear planes | | | | | |
| | | | 33.1 33.4 | 925 | 925.6 925.3 | Shale, gray, limy Limestone, hard, gray, vertical fracture | | | | |
| | | | 7 | | | Limestone, hard, white, sandy texture | | | | |
| | | | 35.5 36.8 | | 923.2 921.9 | Limestone, gray to white, stylolitic seams, wavy-bedded, few fossils, 0.01' clay seam @39.4 | 360 | 1.46E+08 | | 921.81 |
| | | | 8 | | 920 | | 192 | 1.47E+08 | | 918.41 |
| | Lawrence Fm | 9 | | | Limestone, gray, abundant fossil debris Shale, gray, sandy | 45 | 6640000 | | 912.81 | |
| | | | 44.4 44.6 | | 914.3 914.1 | | | | | |
| | | | 48.1 | 910.61 | T.D. = 48.1 | | | | | |



KANSAS DEPARTMENT OF TRANSPORTATION

| | | | | |
|-----------|-------------------------------------|--------------|------------------|----------------------------------|
| RTE./CO. | K-10 / Douglas | SOUNDING NO. | CD 02 | SHEET 3 of 3 |
| | | PROJ. NO. | 10-23 KA-1826-01 | BRIDGE NO. 10-23-2.63(191) |
| SITE NAME | K-10 Bob Billings Parkway over K-10 | | | HOLE STA. 50+40 Bob Billings, CL |

| Bit Type | GEOLOGIC NAME | STRATIGRAPHIC COLUMN | DEPTH | ELEVATION | CLASSIFICATION OF MATERIALS DESCRIPTION AND REMARKS | UNCONFINED COMPRESSION (TSF) | ELASTIC MODULUS (PSF) | N60 COUNT (SPT) | ELEVATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------|---------------|----------------------|-------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-----------------------|-----------------|-----------|-----|-------|-----|---|-----|--------|-----|-----|----|-----|---|-----|--------|-----|-----|-----|-----|---|------|--------|-----|-----|-----|-----|---|------|--------|-----|-----|----|-----|---|------|--------|-----|-----|----|-----|---|------|--------|-----|-----|-----|-----|---|------|--------|-----|-----|-----|-----|---|------|--------|-----|-----|-----|-----|---|------|--------|-----|-----|-----|------|--------------|-------------|---------------|-------------|-------------|-----------|------------|--|--|--|--|
| | | | | | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Core</th> <th>Depth</th> <th>Elev.</th> <th>Cut</th> <th>Rec</th> <th>Rec %</th> <th>RQD</th> </tr> </thead> <tbody> <tr><td>1</td><td>3.1</td><td>955.61</td><td>5.0</td><td>4.2</td><td>84</td><td>20%</td></tr> <tr><td>2</td><td>8.1</td><td>950.61</td><td>5.0</td><td>5.0</td><td>100</td><td>68%</td></tr> <tr><td>3</td><td>13.1</td><td>945.61</td><td>5.0</td><td>5.0</td><td>100</td><td>96%</td></tr> <tr><td>4</td><td>18.1</td><td>940.61</td><td>5.0</td><td>4.8</td><td>96</td><td>90%</td></tr> <tr><td>5</td><td>23.1</td><td>935.61</td><td>5.0</td><td>4.9</td><td>98</td><td>98%</td></tr> <tr><td>6</td><td>28.1</td><td>930.61</td><td>5.0</td><td>5.0</td><td>100</td><td>60%</td></tr> <tr><td>7</td><td>33.1</td><td>925.61</td><td>5.0</td><td>5.0</td><td>100</td><td>80%</td></tr> <tr><td>8</td><td>38.1</td><td>920.61</td><td>5.0</td><td>5.0</td><td>100</td><td>96%</td></tr> <tr><td>9</td><td>43.1</td><td>915.61</td><td>5.0</td><td>5.0</td><td>100</td><td>100%</td></tr> <tr> <td>Total</td> <td>48.1</td> <td>910.61</td> <td>45.0</td> <td>43.9</td> <td>98</td> <td>79%</td> </tr> </tbody> </table> | Core | Depth | Elev. | Cut | Rec | Rec % | RQD | 1 | 3.1 | 955.61 | 5.0 | 4.2 | 84 | 20% | 2 | 8.1 | 950.61 | 5.0 | 5.0 | 100 | 68% | 3 | 13.1 | 945.61 | 5.0 | 5.0 | 100 | 96% | 4 | 18.1 | 940.61 | 5.0 | 4.8 | 96 | 90% | 5 | 23.1 | 935.61 | 5.0 | 4.9 | 98 | 98% | 6 | 28.1 | 930.61 | 5.0 | 5.0 | 100 | 60% | 7 | 33.1 | 925.61 | 5.0 | 5.0 | 100 | 80% | 8 | 38.1 | 920.61 | 5.0 | 5.0 | 100 | 96% | 9 | 43.1 | 915.61 | 5.0 | 5.0 | 100 | 100% | Total | 48.1 | 910.61 | 45.0 | 43.9 | 98 | 79% | | | | |
| Core | Depth | Elev. | Cut | Rec | Rec % | RQD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 3.1 | 955.61 | 5.0 | 4.2 | 84 | 20% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 8.1 | 950.61 | 5.0 | 5.0 | 100 | 68% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 13.1 | 945.61 | 5.0 | 5.0 | 100 | 96% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 18.1 | 940.61 | 5.0 | 4.8 | 96 | 90% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 23.1 | 935.61 | 5.0 | 4.9 | 98 | 98% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 28.1 | 930.61 | 5.0 | 5.0 | 100 | 60% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 33.1 | 925.61 | 5.0 | 5.0 | 100 | 80% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 38.1 | 920.61 | 5.0 | 5.0 | 100 | 96% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | 43.1 | 915.61 | 5.0 | 5.0 | 100 | 100% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 48.1 | 910.61 | 45.0 | 43.9 | 98 | 79% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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